

NON-PUBLIC?: N

ACCESSION #: 9407250124

LICENSEE EVENT REPORT (LER)

FACILITY NAME: COMANCHE PEAK-UNIT 2

PAGE: 1 OF 5

DOCKET NUMBER: 05000446

TITLE: REACTOR TRIP/TURBINE TRIP DUE TO A SHORT IN THE CURRENT
TRANSFORMER CABLE

EVENT DATE: 06/27/94 LER #: 94-010-00 REPORT DATE: 07/22/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: W. G. Guldemon, System Engineering TELEPHONE: (817) 897-8739

Manager

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On June 27, 1994 at approximately 4:54 p.m. Comanche Peak Steam Electric
Station (CPSES) Unit 2 experienced an automatic reactor trip from a

turbine generator trip. The plant sequence of event recorder logged a generator differential lock-out relay actuation. All required systems functioned as designed.

The event was caused by a short in the lead of the B phase neutral current transformer on the generator.

Corrective actions were to replace the lead in accordance with plant procedures.

END OF ABSTRACT

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I. DESCRIPTION OF THE REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

An event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF) including the Reactor Protection System (RPS).

B. PLANT OPERATING CONDITIONS PRIOR TO THE EVENT

On June 27, 1994, just prior to the event, Comanche Peak Steam Electric Station (CPSES) Unit 2 was in Mode 1, Power Operation, with reactor power at 100 percent.

C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

There were no inoperable structures, systems or components that contributed to the event.

D. NARRATIVE SUMMARY OF THE EVENT, INCLUDING DATES AND APPROXIMATE

TIMES

On June 27, 1994, at approximately 4:54 p.m. CPSES Unit 2 was at 100 percent power, when it received a reactor trip following a turbine trip. The Auxiliary Feedwater System (EIIS:(BA)) actuated at the LO-LO Steam Generator (EIIS:(SG)(SB)) level. All systems responded as required.

The Nuclear Regulatory Commission was informed of the event via the Emergency Notification System at approximately 8:24 p.m. pursuant to the requirements of 10CFR50.72.

E. THE METHOD OF DISCOVERY OF EACH COMPONENT OR SYSTEM FAILURE, OR

PROCEDURAL OR PERSONNEL ERROR

The reactor trip was annunciated by numerous alarms in the Control Room. The immediate cause of the event was identified by troubleshooting after the event.

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II. COMPONENT OR SYSTEM FAILURES

A. FAILURE MODE, MECHANISM, AND EFFECT OF EACH FAILED COMPONENT

A generator trip was initiated by a protective relay actuation due to a short in the cable (EIIS:(CBL2)(TB)) extending from the Phase B primary to booster current transformer for the main

electric generator. Visual examination of the cables revealed that they had been exposed to elevated temperatures. The prolonged exposure to these temperatures resulted in degradation of the cable conductor insulation, which eventually came in contact with the conduit causing a short circuit to ground.

B. CAUSE OF EACH COMPONENT OR SYSTEM FAILURE

Excessive heating of the cables was caused by an elevated temperature of the surrounding rigid conduit (EIIS:(CND)(TB)). The galvanized steel conduit was installed in close proximity to the generator terminal bushings. The magnetic flux present in the area apparently induced electromagnetic heating in the ferro-magnetic conduit material. With concomitant hysteresis losses, the conduit became excessively hot.

C. SYSTEM OR SECONDARY FUNCTIONS THAT WERE AFFECTED BY FAILURE OF

COMPONENTS WITH MULTIPLE FUNCTIONS

There were no secondary effects due to the cable failure. As designed, the associated protective relaying sensed the grounding or shorting of the cable and processed the sensed condition as a potential fault internal to the generator (generator differential relaying).

D. FAILED COMPONENT INFORMATION

Component - 2 conductor, 6AWG, 600 volt cable

Manufacturer - Okonite

III. ANALYSIS OF THE EVENT

A. SAFETY SYSTEM RESPONSES THAT OCCURRED

The RPS and Auxiliary Feedwater System (EHS:(BA)) actuated during the event; all associated components within these systems functioned as designed.

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B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

Not applicable - no safety system trains were inoperable as a result of this event.

C. SAFETY CONSEQUENCES AND IMPLICATIONS OF THE EVENT

A turbine trip initiated by a generator trip protects from a reduction in the capability of the secondary system to remove heat generated in the reactor core. This event is analyzed in Section 15.2.3 of the CPSES Final Safety Analysis Report (FSAR). The analysis uses conservative assumptions to demonstrate the capability of pressure relieving devices and to demonstrate core protection margins. The event of June 27, 1994, occurred at 100 percent reactor power, and all systems and components functioned as designed. The event is bounded by the FSAR accident analysis which assumes an initial power level of 102 percent and conservative assumptions which reduce the capability of safety systems to mitigate the consequences of

the transient. It is concluded that the event of June 27 did not adversely affect the safe operation of CPSES Unit 2 or the health and safety of the public.

IV. CAUSE OF THE EVENT

A review of the sequence of events recorder indicated that the Channel 1 lockout relay operated, resulting in the trip. A main electric generator neutral side differential lock-out relay on Phase B was actuated, but no ground detection circuits operated, indicating that the generator likely did not experience a phase-to-ground fault. Additionally, as differential relaying on the remaining phases was not actuated, no phase-to-phase failure was indicated.

A legitimate fault in the generator could not be supported by the observed behavior of the protective relaying sequence. All protective relaying was functionally checked and calibration confirmed with no evidence of degraded performance. Further efforts to determine the cause led to discovery of the failed cable in the B phase neutral current transformer lead which caused the main generator differential lock-out relay actuation and a subsequent reactor trip.

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V. CORRECTIVE ACTIONS

Immediate corrective action entailed replacing the cables extending

from each of six primary current transformers to several booster, or secondary current transformers. The replacement cable was the same material.

After the unit was returned to service, temperature surveys of the areas surrounding the generator terminal bushings revealed elevated temperatures on the conduit for the neutral Phase B conduit. The unit was shutdown on July 9, 1994, and the conduit sections on both the line and neutral sides in the proximity to the bushings were replaced with non-ferromagnetic material which would not be susceptible to electromagnetic heating. In addition, the cable was also replaced with a higher temperature-rated cable on all six current transformers.

There is no impact on CPSES Unit 1, since the conduit material in Unit 1 are not similar to Unit 2.

VI. PREVIOUS SIMILAR EVENTS

There are other CPSES Licensee Event Reports (LERs) involving turbine/reactor trips; however, the details of previously reported events are sufficiently different from the events described in the subject LER, such that previous corrective actions could not have prevented this event.

VII. ADDITIONAL INFORMATION

All times listed in this report are approximate and in Central Daylight Time (CDT).

ATTACHMENT TO 9407250124 PAGE 1 OF 1

Log # TXX-94198

File # 10200

Ref. # 10CFR50.73(a)(2)(iv)

TU ELECTRIC

William J. Cahill, Jr. July 22, 1994

Group Vice President

U. S. Nuclear Regulatory Commission

Attn: Document Control Desk

Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSSES) - UNIT 2

DOCKET NO. 50-446

MANUAL OR AUTOMATIC ACTUATION OF ANY ENGINEERED SAFETY
FEATURE

LICENSEE EVENT REPORT 94-010-00

Gentlemen:

Enclosed is Licensee Event Report (LER) 94-010-00 for Comanche Peak Steam

Electric Station Unit 2, "Reactor Trip/Turbine Trip Due to a Short in the

Current Transformer Cable."

Sincerely,

William J. Cahill, Jr.

By:

J. J. Kelley, Jr.

Vice President of Nuclear

Engineering & Support

DWS:tg

ENCLOSURE

cc: Mr. L. J. Callan, Region IV

Ms. M. A. Miller, Region IV

Resident Inspectors, CPSES

P.O. Box 1002 Glen Rose, Texas 76043-1002

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